BOLTNEVA, L. I.; VASILENKO, V. N.; DMITRIYEV, A. V.; IONOV, V. A.; KOGAN, R. M.; KUZNETSOVA, Z. V.; NAZAROV, I. M.; YAGODOVSKIY, I. V.

Use of the method of air-borne gamma-spectrometry in studying the radioactivity of granitoid intrusives. Izv. AN SSSR. Ser. geofiz. no.6:858-871 Je '64. (MIRA 17:7)

IONOV, V.A., kand. tekhn. nauk

Applying the hypothesis of nonplane sections to the determination of stresses caused by torsion in hollow circular rods with notches. Trudy GPI 18 no.4:50-58 '63.

Applying the hypothesis of broken sections to the determination of stresses in hollow rods with notches. Ibid.:59-68

(MIRA 17:9)

IGNOV, V. A.

Dissertation: -- "Problem of Calculating the Parts of a Complex Form by the Method of a Nonplanar Cross Section." Cand Tech Sci, Gor'kiy Polytechnic Inst, Gor'kiy, 1954. (Referativnyy Zhurnal--Mekhanika, Moscow, Jun 54)

SO: Sum 318, 23 Dec. 1954

~~ALEKSANDROVICH, V.A.~~ IONOV, V.A.

PHASE I BOOK EXPLOITATION 800

Verkhovskiy, Aleksandr Vasil'yevich; Andronov, Vladimir Pavlovich; Ionov, Vladimir Aleksandrovich; Lupanova, Ol'ga Konstantinovna; and Chevkinov, Viktor Ivanovich

Opredeleniye napryazheniy v opasnykh secheniyakh detaley slozhnoy formy; metod neploskikh secheniy (Determination of Stresses in Critical Sections of Members of Complex Forms; Method of Nonplane Sections) Moscow, Mashgiz, 1958. 146 p. 3,000 copies printed.

Reviewer: Vagapov, R.D., Candidate of Technical Sciences; Ed.: Preyss, A.K., Candidate of Technical Sciences; Ed. of Publishing House: Korableva, R.M., Engineer; Tech. Ed.: Model', B.I.; Managing Ed. for literature on general technical and transport machine building (Mashgiz): Ponomareva, K.A., Engineer.

PURPOSE: This book is intended for design engineers, scientific workers and students.

COVERAGE: The book contains a description of an approximate method of stress analysis in critical sections of complex components. The method is based

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Determination of Stresses in Critical Sections (Cont.) 800

on the nonplane (angular, cylindrical, spherical) section hypothesis. Analytical formulas are given for the determination of stress concentration factors for flat, rectangular, and circular bars of variable cross section subjected to tension, flexure and torsion. Results are presented of an experimental study of stress distribution in samples of variable sections having different dimension ratios. Illustrative examples of the analysis of bending and tension of a flat plate having symmetrical and asymmetrical cutouts and shoulders are given and examples of tension, torsion, and bending of a shaft with cutouts and shoulders are also presented. There are 29 references, of which 24 are Soviet, 3 are English and 2 are German.

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Determination of Stresses in Critical Sections (Cont.) 800

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Determination of Stresses in Critical Sections (Cont.) 800

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Determination of Stresses in Critical Sections (Cont.) 800

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AVAILABLE: Library of Congress

IS/mas
12-12-58

Card 6/6

IONOV, V.A., kand.tekhn.nauk, dots.

Experimental investigation of stress distribution in plates having bilateral cut-outs and subjected to eccentric stretching. Trudy GPI 13 no.8:6-12 '58. (MIRA 13:2)
(Elastic plates and shells)

IONOV, V.A., kand.tekhn.nauk, dots.

Using the hypothesis of nonplane sections in graphic calculation of stresses in rods with annular grooves. Trudy GPI 13 no.8: 13-25 '58. (MIRA 13:2)
(Elastic rods and wires)

IONOV, V.A., dotsent, kand.tekhn.nauk

Using the hypothesis of spherical cross sections in determining stresses and the concentration coefficient resulting from the torsion of rods with annular grooves. Izv.vys.ucheb.zav.; mashinostr. no.5:92-97 '59. (MIRA 13:4)

1. Gor'kovskiy politekhnicheskiy institut im. Zhdanova.
(Elastic rods and wires)

IONOV, V.A., kand.tekhn.nauk

Theoretical and experimental investigations of stress distributions in grooved rods. Trudy GPI 16 no.1 pt.2:14-21 '60. (MIRA 14:4)
(Elastic rods and wires)

S/138/60/000/007/005/010
A051/A029

AUTHORS: Malkina, Kh.E.; Pukhov, A.P.; Ionov, V.A.

TITLE: The Ultrasonic Defectoscopy of Tire Casings

PERIODICAL: Kauchuk i Rezina, 1960, No. 7, pp. 12 - 20

TEXT: In most Soviet plants the quality check of tire casings has been conducted until recently by external examinations and knocking. This method was satisfactory due to its subjective nature. The ultrasonic defectoscopy method is recommended. Figure 1 represents the operation principle of an ultrasound apparatus. The NIIShP of the Soviet Union has designed an apparatus which is described in great detail. It has 6 channels plus an extra receiver and generator to ensure continuous operation in cases of a channel break-down. Figure 2 is an external view of the apparatus. The circuit diagram (Fig. 3) of the apparatus contains a block of feeders, a generator, receivers and transmitters. The feeding block has its own regulators, located on the front panel of the casing. The circuit diagram of the feeding block is shown in Figure 4, and that of the generator in Figure 5. The circuit diagram of the receiver is given in Figure 6. A diagrammatic cross-section of the transmitter is seen in Figure 7. The emitter

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The Ultrasonic Defectoscopy of Tire Casings

contained in the metal body is made of barium titanate. The thickness of the barium titanate plate is calculated from the formula

$$t = \frac{2200}{\varphi} = \frac{2200}{50} = 44,$$

so that it can function at a frequency of 50 and 150 Mc. In the formula t is the thickness of the plate in mm, φ - the resonance frequency in Mc. The casings being tested must be clean. Otherwise the defectoscope may give false readings. Water is used as wetting liquid with additions of 10 - 15% ethyl alcohol to ensure more uniform wetting of the casing. The authors tested casings of various sizes, starting at 5.60 - 15 to 12.00 - 20. The number of correct readings represented 93% of the total tested. There were different defects present, such as lamination, porosity, air bubbles, foreign bodies, destruction of the casing. The results of the tests conducted with the defectoscope are listed in Table 3. As a result of the experiments and tests carried out by the authors, several conclusions were drawn: 1) The defectoscope operating with 50 kc can detect defects in casings of small dimensions comprising a thin-walled body (5.60 - 15), as well as in massive casings with thick-walled bodies (12.00 - 20). 2) The size of the smallest defects detected with the apparatus on an equivalent surface was 7 - 8 mm in diameter, which shows that the apparatus has a high sensitivity. False data in most

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The Ultrasonic Defectoscopy of Tire Casings

cases meant the detection of "false" defects. 4) The reliability of the apparatus in operation is high. During its functioning period (one year) no damages in the electrical part of the apparatus were observed. 5) The apparatus described can be installed in tire plants as a laboratory and production apparatus for selective, total or combined flaw detection, as well as in automobile and tire-repair plants. 6) The drawback of the defectoscope is the absence of a recorder of the defects shown. The duration of the testing of one casing will be 4 min when an automatic recorder and a perfected tub are introduced into the design of the defectoscope. There are 3 tables, 4 circuit diagrams, 2 diagrams, 1 graph, 1 photograph and 3 English references.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti (Scientific Research Institute of the Tire Industry)

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S/032/60/026/011/015/035
B015/B066

AUTHORS: Ryzhov, V. I. and Ionov, V. A.

TITLE: Ultrasonic Quality Control of Tires

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 11, pp. 1244-1247

TEXT: The authors describe a device of the UA-1 (ShD-1) type for the detection of material defects in tires by means of the ultrasonic immersion method. M. F. Krakovyak, Kh. E. Malkina, and P. G. Vobova took part in the development of this device. The tire cover is submerged into the liquid, the ultrasound emitter is introduced into the cover and the receivers of the ultrasonic vibrations are placed around the part of the cover to be tested. The emitter applied may operate at frequencies of 50 and 150 kc/sec. The vibrator of the emitter is a ring-shaped barium titanate piezo element which is placed in a cylindrical plexiglass casing. An oil film between piezo element and casing is used as acoustic contact. The electrodes are applied to the inner and outer surface by means of

Ultrasonic Quality Control of Tires

S/032/60/026/011/015/035
B015/B066

silver paste. The vibrator of the receiver consists of a rectifier, a piezoelectric crystal plate, and a reflector. The mechanical part of the testing instrument consists of a container for the liquid and auxiliary mechanisms. Tires of any dimension can be tested. By means of the mechanism the tire can be rotated with a speed of 2 rpm. Tests with pure water, 15% alcohol in water, 0.5% solution of "nikal" in water and 0.5% solution of the OП-10 (OP-10) wetting agent in water disclosed that wetting with water and with the alcoholic solution is insufficient, that, however, the wetting agent solutions considerably foam, so that a suitable contact liquid had to be selected. The device described was found to detect separations of layers covering a surface of 20 x 20 mm at a frequency of 50 kc/sec and of a surface of 10 x 10 mm at 150 kc/sec. There are 5 figures and 1 Soviet reference.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut tekhnologii i mashinostroyeniya (Central Scientific Research Institute of Technology and Machine Building), Nauchno-issledovatel'skiy institut shinnoy promyshlennosti (Scientific Research Institute of Tire Industry)

Card 2/2

IONOV, V.A., kand. tekhn. nauk

Determining stresses in hollow round rods with notches along the hypotenuse of nonplanar sections. Trudy GPI [illegible]. 63-74 '61. (MIRA 16:12)

IONOV, V.A., kand. tekhn. nauk; LUPANOVA, O.K., kand. tekhn. nauk; VERKHOVSKIY, A.V., doktor tekhn. nauk

Bending stress calculation in a rod with an annular groove and an axial hole. Trudy GPI 17 no.3:75-79 '61. (MIRA 16:12)

BALYASNYY, N.D.; BOLTNEVA, L.I.; DMITRIYEV, A.V.; IONOV, V.A.; NAZAROV, I.M.

Determining the radium, thorium and potassium content of rocks from an airplane. Atom.energ. 10 no.6:626-629 Je '61. (MIRA 14:6)

(Aeronautics in geology) (Radioactive substances)

S/874/62/000/002/002/019
D218/D308

AUTHORS: Balyasnyy, N.D., Dmitriyev, A.V., Ionov, V.A. and Nazarov, I.M.

TITLE: Spectrometric studies of natural emitters using large-volume scintillators

SOURCE: Akademiya nauk SSSR. Ural'skiy filial. Institut geofiziki. Trudy. no. 2, 1962. Geofizicheskiy sbornik, no. 3, 57-62

TEXT: A determination is reported of the ratio of the amounts of thorium and uranium in natural rocks. The apparatus employed incorporated a cylindrical plastic scintillator with a ФЭУ-24 (FEU-24) photomultiplier at each end. The plastic phosphor (20 cm diameter, 40 cm long) consisted of two equal parts in optical contact with each other. It was surrounded by a cotton wool reflector in order to improve light collection. The outputs of the two photomultipliers were added together which ensured that the pulse amplitude was independent of the position of the scintillation within the phos-

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Spectrometric studies ...

phor. The resolution of the Cs^{137} photopeak was found to be 22%. The scintillation pulses were examined with a fixed channel covering a pulse-height range corresponding to 2 - 2.6 MeV and a further channel which corresponded to one of the following four possible energy regions: 0.3 - 2.6, 1.0 - 1.5, 1.0 - 2.0 and 1.5 - 2.0 MeV. Analysis of the results obtained with these channels showed that the error in determination of the Th/U ratio from the counting rate ratio for the two channels is a minimum when channel No. 2 covers the range 2.0 - 2.6 MeV. There are 3 figures and 1 table.

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S/124/63/000/002/020/052
D234/D308

AUTHOR: Ionov, V.A.

TITLE: Determination of stresses in round hollow rods with notches, by the hypothesis of non-plane sections

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 2, 1963, 3, abstract 2V14 (Tr. Gor'kovsk. politekhn. in-ta, v. 17, no. 3, 1961, 63-74)

TEXT: The author determines the stresses in round rods having an axial hole and an external notch (groove, hollow chamfer, convex boundary) subjected to tensile stress. Solutions are obtained using the hypothesis of non-plane sections (A.V. Verkhovskiy, Tr. Gor'kovsk. politekhn. in-ta v. 9, no. 1, 1951). Stress concentration coefficients obtained by the above hypothesis are compared with quantities obtained by Neuber's interpolation formula for a hollow rod with a ring-shaped groove. The deviation is 5 - 7%. 4 references.
[Abstracter's note: Complete translation]

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S/124/63/000/003/027/065
D234/D308

AUTHORS: Ionov, V. A., Lupanova, O. K. and Verkhovskiy, A. V.

TITLE: Calculation of stresses during bending in a rod with a ring-shaped groove and an axial hole

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 3, 1963, 8, abstract 3V43 (Tr. Gor'kovsk. politekhn. in-ta, 1961, v. 17, no. 3, 75-79)

TEXT: The authors determine the stresses during bending of a rod having the form of a body of revolution, as above. The solution is obtained using the hypothesis of non-plane sections for both shallow and deep grooves (see V. A. Ionov, Tr. Gor'kovsk. politekhn. in-ta, 1961, v. 17, no. 23, 63-74). Stress concentration coefficients obtained by the authors are compared with magnitudes obtained using Neuber's interpolation formula. 4 references. [Abstracter's note: Complete translation.]

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BOLTNEVA, L.I.; VASILENKO, V.N.; DMITRIYEV, A.V.; IONOV, V.A.; NAZAROV, I.M.; YAGODOVSKIY, I.V.

Experimental determination of radium, thorium, and potassium in rocks from an airplane by means of a NaJ(Tl) crystal pickup. Atom. energ. 13 no.3:280-282 S '62. (MIRA 15:9)
(Gamma-ray spectrometry) (Radioactivation analysis)

VASILENKO, V.N.; DMITRIYEV, A.V.; IONOV, V.A.; KOGAN, R.M.; NAZAROV, I.M.; FRIDMAN, Sh.D.

Using the gamma-ray spectrum surveying method in geology.
Sov. geol. 6 no.10:47-62 O. '63. (MIRA 17:1)

1. Institut prikladnoy geofiziki AN SSSR.

L 1268-66 EWT(1)

ACCESSION NR: AR5008450 UR/0271/65/000/002/A091/A092
62-5:629.135

SOURCE: Ref. zh. Avtomatika, telemekhanika i vychislitel'naya tekhnika. Svodnyy tom, Abs. 2A523

AUTHOR: Balyasnyy, N. D.; Dmitriyev, A. V.; Ionov, V. A.

TITLE: Device for automatic subtraction of background (noise)

CITED SOURCE: Sb. Geofiz. priborostr. Vyp. 18, L., Nedra, 1964, 17-25

TOPIC TAGS: background subtraction, automatic background subtraction, air gamma survey

TRANSLATION: In automating the processing of air-gamma-survey materials (intensity-flight-altitude calculations, channel rate-of-counting division, etc.), a special device must be used for presubtracting the background components during the flight. A device is described which automatically subtracts the background rate-of-counting in the pulse form. The advantage of this method of isolating the desirable signal lies in the fact that the background is subtracted right at the radiometer input; hence, the automatic-stabilization circuit in the air-survey

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L 1268-66
ACCESSION NR: AR5008450 D

system is simplified, the background compensation with sensitivity-scale switching becomes unnecessary, and the possibility of count recording in the pulse form with an accuracy of one pulse is retained. The equipment includes a two-position subtracting unit, an electronic delay circuit, a logical unit, and a memory unit. The subtracting-unit error is investigated for the particular case when the pulse sequence is set by a separate background frequency-stabilized generator, and the input pulses are statistically distributed according to the Poisson law. If the subtracting unit switch has more than two positions, missing of a pulse of the background generator will depend not only on the number of the arrived input pulses but also on the switch position at the start of the period; therefore, in this case, the operation would be described by a Markov-type-circuit probabilistic process. A table and a recurrent formula set up for various sequences of the input pulses are analyzed. A principal circuit realizing the simplest switch is described. Bibl. 3, figs. 3.

SUB CODE: DP, EC ENCL: 00

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BOLTNEVA, L.I.; BUYANOVA, L.I.; DMITRIYEV, A.V.; IONOV, V.A.; KOGAN, R.M.; NAZAROV, L.M.

Radioactivity of sands in Central Asia. Dokl. AN SSSR 165 no.1:183-186 N '65. (MIRA 18:10)

1. Submitted March 16, 1965.

IONOV, V.A.

Spectral distribution in the atmospheric ground layer of gamma rays from a Co^{60} point source shielded by an aluminum layer. Atom. energ. 19 no.4:397-398 O '65.

(MIRA 18:11)

L 28366-66 EWA(h)/EWT(m)/EWP(t)/ETI IJP(c) JH/JD

ACC NR: AP5026454 SOURCE CODE: UR/0089/65/019/004/0397/0400

AUTHOR: Ionov, V. A.

ORG: none

TITLE: Spectral distribution of gamma rays in the air near the ground from a Co-60 point source shielded by an aluminum screen

SOURCE: Atomnaya energiya, v. 19, no. 4, 1965, 397-400

TOPIC TAGS: gamma radiation, radiation simulation, air pollution, spectral distribution, radiation shielding, cobalt, radioisotope, atmospheric radiation, radiation measurement

ABSTRACT: The measurements of gamma radiation above the earth's surface are described. The experiments were conducted from the tower of the Institute of Applied Geophysics in the arrangement shown in Fig. 1. Here M is a Co-60 source while A represents a scintillation detector installed on the tower platforms at the heights H of 50 and 100 m. A mobile Co-60 source equivalent to 3 grams of Ra was placed at 15 cm above the ground and at various distances L (25, 50, 100, 150 and 200 m) from the tower. A square aluminum sheet of 2 x 2 m was used as a shield. The thickness d of absorbing aluminum layer was changed from zero to 1, 2, 4, 8 and

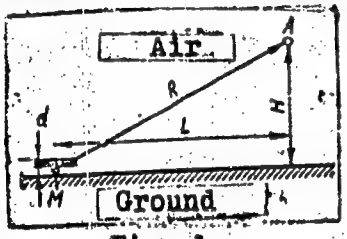

Fig. 1

UDC: 621.039.58:539.121.73

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L 28366-66

ACC NR: AP5026454

6

12 cm. The AI-100-1 analyzer was used. The energy resolution of the spectrometer was 12.5%. The number matrix method was used for treating the spectrogram data for Compton scattering. The energy distribution function I (E, H, L, d) reduced with respect to the intensity J_0 of straight rays was calculated and a series of curves for various E (in Mev) and different values of H, L and d was obtained. A formula for calculating J_0 was given. The total measurment error varied from 10% (at $d < 4$ cm) to 20% (at $d > 4$ cm). The gamma ray distribution from the point source ($d = 0$) was compared with that from an infinate flat isotropic film. A graphic representation traced for H equal to 50 and 100 m showed a coincidence of the compared energy distributions within the error limits of some percents. The problem of gamma radiation from thick, bulky sources (for instance from rock deposits) was also investigated and graphically illustrated by integrating gamma radiations from the point sources shielded by aluminum screen (0-12 cm). A table was given in which experimental gamma dose rates were compared with the data calculated by means of the Monte Carlo method. Gratitude was expressed to R. M. Kogan and I. M. Nazarov for critical observations and discussions. Also to V. A. Vorob'yev, A. V. Dmitriyev and Sh. D. Fridman for their assistance. Orig. art. has: 4 figures and 1 table.

SUB CODE: 04,20 / SUBM DATE: 26Apr65 / ORIG REF: 004 / OTH REF: 002

Card 2/2 CC

IONOV,V.F.; inzhener

Some aspects and causes of wear and breakdown in the working parts of ZD6 engines. Rech.transp. 14 no.8:13-16 Ag'55. (MLRA 8:11)
(Marine engines)

AUTHORS: Ionov, V.G. and Konkin, M.I. (Engineers) 100-5-9/10

TITLE: New hydraulic jack for tensioning steel reinforcement. (Novyy gidravlicheskiy domkrat dlya natyazheniya provoloki).

PERIODICAL: "Mekhanizatsiya Stroitel'stva" (Mechanisation of Construction), 1957, Vol.14, No.5, pp.29 - 31 (USSR).

ABSTRACT: Designers of the Sheksnin factory of Transport Constructions (Ministerstvo Transportnogo Stroitel'stva) constructed the new hydraulic jack GD-15 (ГД-15). This supersedes the jack SM-539 (СМ-539). The new jack consists of a main body to which 5 small jacks are fixed, one for each steel rod. The jack is suspended in the horizontal position to allow for the use in various levels and positions (from a stand on wheels). The stand incorporates manually operated gears and other controls. The jack is designed for a working pressure of 300 kg/cm^2, the capacity of each of the small jacks (in tensioning) being 3400 kg, the maximum displacement being 105 mm. The gripping capacity is 1500 kg and the weight of the whole jack is 82 kg. It was designed for tensioning of five 5 mm diameter rods. It can, however, be constructed with varying numbers of small jacks, i.e. different number of rods and different diameters. The introduction of this jack has increased the output 10 - 15

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fold, losses decreased considerably, the quality of the work as well as safety was improved.

There are 4 figures.

AVAILABLE:

Card 2/2

BARANOVSKIY, M.A., kand.tekhn.nauk; IONOV, V.G., insh.

Investigating the process of flanging low-carbon steels. Mash. Bel. no.6:56-62 '59. (MIRA 13:6)
(Metalwork)

L 15899-66 EWT(m)/ETC(f)/EWP(b)/T/EWP(e)/EWP(t)/EWG(m)/ IJP(c) AT/WH/JD/JG

ACC NR: AT6002251 SOURCE CODE: UR/2564/65/006/000/0203/0205

AUTHOR: Novikov, V. P.; Ionov, V. I.

ORG: None

TITLE: Preparation of alpha-silicon carbide single crystals [Paper presented at the Third Conference on Crystal Growing held in Moscow from 18 to 25 November, 1963]

SOURCE: AN SSSR. Institut kristallografii. Rost kristallov, v. 6, 1965, 203-205

TOPIC TAGS: silicon carbide, crystal growing, crystal structure

ABSTRACT: The article deals with the study of certain factors affecting the growth and properties of α-SiC single crystals grown from the vapor phase by the method of J. A. Lely (Ber. deutsch. keram. Ges. 32, 229, 1955). The method was substantially improved by using a thin-walled sleeve forming a cavity and having apertures for discharging the crystals; the advantage of the sleeve is that it restricts the disordered growth of crystals and makes it possible to use powdered SiC synthesized from pure materials and to equalize the thermal field inside the cavity. To increase the probability of nucleation, various methods of producing supersaturation at the start of the growth process were

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ACC NR: AT6002251

employed, the best of which was found to be a brief cooling of the cavity of the crucible; the formation of crystals was thus stabilized over a wide temperature range (2350 — 2600C). The main factors influencing the crystal growth are the radial and axial temperature gradients, which were calculated. Most of the crystals had a hexagonal six-layer structural form C_6 mc (6/2); 15-layer rhombohedral R_3 m (15/3), 10-layer trigonal C_3 m (10/1), and 8-layer hexagonal C_6 mc (8/2) forms were found less frequently. Correlations were established between the properties of the SiC single crystals and the design of the furnaces employed. Crystals of n-type with a resistivity of about 1000 ohm cm and of p-type with a resistivity of about 25000 ohm cm were obtained. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: none/ OTH REF: 002

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SOV/153-2-4-3/32

5(4)

AUTHORS: Morozov, I. S., Korshunov, B. G., Kokorev, V. V., Ionov, V. I.

TITLE: Thermal and Tensimetrical Investigation of the System $NbCl_5$-$FeCl_3$-NaCl

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1959, Vol 2, Nr 4, pp 485 - 489 (USSR)

ABSTRACT: The investigation of the subject mentioned in the title is of interest with regard to the preparation of easily fusible melts containing niobium as well as to the purification of $NbCl_5$ from $FeCl_3$. The system mentioned in the title is part of the quaternary system $NbCl_5$-$FeCl_3$-$AlCl_3$-NaCl. A thorough investigation of the latter will make it possible to produce melts with a crystallization temperature lower than that of the adjacent ternary systems (Ref 2). In the treatment of raw material containing niobium by chlorine a simpler condensation device is sufficient for easily fusible melts. The binary lateral systems adjacent to the system mentioned in the title have already been investigated earlier (Refs 3-5). In order to investigate the ternary system, five inner sections were made, and several mixtures determined

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1

which do not form independent sections. Tables 1 and 2 show the results. The crystallization of the melts the figurative points of which are in the triangle $NbCl_5$-$FeCl_3$-$NaFeCl_4$ in the phase diagram is concluded in the triple eutectic point E_2; the solid alloys consist of the phases $NbCl_5$, $FeCl_3$ and $NaFeCl_4$.

The tensimetrical investigation of the system mentioned in the title was supposed to prove the results of the thermal analysis mentioned above. Moreover, the possibility of separating niobium chloride and iron chloride was to be examined. For this purpose, the vapor tensions over the mixtures of $NbCl_5$, $FeCl_3$ and NaCl were determined between 130 and 320°. For method and apparatus see reference 3. A table (without number) shows the composition of these mixtures in mol%. The results are shown in table 1 and figure 3. The results of the thermal analysis were proved by tensimetrical investigations of the system mentioned in the title. Moreover, the possibility of separating niobium chloride and iron chloride by means of fractional distillation in the presence of NaCl was proved. In addition, vessels by Stepanov were mentioned in the paper.

Thermal and Tensimetrical Investigation of the System $NbCl_5$-$FeCl_3$-NaCl SOV/153-2-4-3/32

There are 3 figures, 1 table, and 6 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni M. V. Lomonosova, Kafedra tekhnologii redkikh i rasseyarnykh elementov (Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov, Chair of Technology of Rare and Dispersed Elements)

SUBMITTED: April 28, 1958

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SOV/78-4-6-41/44

5(4)

AUTHORS: Morozov, I. S., Ionov, V. I., Korshunov, B. G.

TITLE: Thermal Analysis of the System $NdCl_3$-$MgCl_2$-KCl (Termicheskiy analiz sistemy $NdCl_3$-$MgCl_2$-KCl)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 6, pp 1457 - 1458 (USSR)

ABSTRACT: The system $NdCl_3$-$MgCl_2$-KCl was investigated by the method of the thermal analysis; the phase diagram was constructed and is shown in figure 1. 7 internal sections were investigated in the three-component system. It was found that 7 regions of primary crystallization are formed on the surface of the liquidus corresponding to the compounds KCl, $NdCl_3$, $MgCl_2$, K_3NdCl_6, K_2NdCl_6, KCl.$MgCl_2$ and 2KCl.$MgCl_2$. The four-phase equilibrium in the system $NdCl_3$-$MgCl_2$-KCl is given in a table. The existence of the compound 2KCl.$MgCl_2$ was confirmed in the system $MgCl_2$-KCl. There are 1 figure, 1 table, and 6 references, 4 of which are Soviet.

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S/149/60/000/003/010/012/XX
A006/A001

AUTHORS: Ionov, V.I., Korshunov, B.G., Kokorev, V.V., Morozov, I.S.

TITLE: Physical and Chemical Study on Interaction of Thorium Chloride With Chlorides of Alkali-Metals and Cerium in Melts

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No. 3, pp. 102-108

TEXT: Literature data on thorium chloride chemistry are incomplete and obsolete. The authors investigated the interaction of thorium chloride with chlorides of sodium, potassium, cesium and cerium in melts, for the purpose of completing the knowledge about the physical and chemical nature of some technological processes of thorium chloride preparation. Thorium chloride was prepared by chlorination of thorium dioxide mixed with charcoal from sugar, by gaseous chlorine at 1,000-1,050°C. The melting temperature of the chloride obtained was 750°C. Vapor tension of thorium chloride corresponding to its melting temperature was about 80 mm Hg. Cerium chloride was prepared by the method described in Reference 16. The melting temperatures of chlorides of sodium, potassium, cesium and cerium were 800, 776, 646 and 802°C, respectively. The chloride systems

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A006/A001

Physical and Chemical Study on Interaction of Thorium Chloride With Chlorides of Alkali-Metals and Cerium in Melts

were studied by thermal and tensimetric analyses. The thermal analysis was made by differential and plain recording of heating and cooling curves on a N.S. Kurnakov pyrometer. The temperature was measured with a platinum- platinum rhodium thermocouple graduated according to conventional datum points. Melting of the salt mixtures and recording of curves was made in quartz glass Stepanov containers. After filling the container with the salt mixture, the air was evacuated by a dry hydrogen chloride current. The container was then sealed and placed in a furnace. The cooling rate was 4-10°C per minute, depending on the temperature range. It was established that in the $ThCl_4$-MeCl systems the components formed chemical compounds of the $MeThCl_5$, Me_2ThCl_6, Me_3ThCl_7 type (excepted the $ThCl_4$-NaCl system). The $NaThCl_5$ system melts incongruently at 370°C, $KThCl_5$ and $CsThCl_5$ melt congruently at 428 and 490°C respectively Na_2ThCl_6 melts congruently at 360°C; K_2ThCl_6 and $CsThCl_6$ melt incongruently at 406 and 573°C respectively; K_3ThCl_7 and Cs_3ThCl_7 melt congruently at 705 and 720°C respectively. Data obtained by thermal analysis are confirmed by tensimetric investigation of the system. The tensimetric analysis was made by the dynamic method. The determination of chloride vapor tension was conducted in chlorine atmosphere. The amount of the initial

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Physical and Chemical Study on Interaction of Thorium Chloride With Chlorides of Alkali-Metals and Cerium in Melts

mixture in all experiments was about 30 g. The salt mixtures were melted in sealed ampoules cooled, crushed in argon atmosphere, and placed into the apparatus. The amount of chlorine passed was determined from the increase in weight of the potash bulbs filled with 25% NaOH solution. The rate of the chlorine current was sufficient to saturate the volatile chlorides. The quantity and composition of the sublimate were determined by chemical analysis and the pressure in the apparatus by the sum of atmospheric and excess pressure obtained when the gas passed through the absorption flasks. A formula is given to calculate the partial vapor tension of the mixture components, and values of vapor tension of thorium chloride over Na_2ThCl_6, K_3ThCl_7 and Cs_3ThCl_7 at various temperatures are given. It was established that the thermal stability of thorium chloride combined with alkali metal chlorides changed regularly, increasing from sodium chloride to cesium chloride. The method of thermal analysis was used to study fusibility of the systems $ThCl_4$ - $CeCl_3$ and $ThCl_4$ - $CeCl_3$ - NaCl, which was shown on fusibility

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A006/A001

Physical and Chemical Study on Interaction of Thorium Chloride With Chlorides of Alkali-Metals and Cerium in Melts

diagrams. There are 4 figures, 1 table and 20 references: 5 Soviet, 8 English, 3 French and 4 German.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskiy tekhnologii (Moscow Institute of Fine Chemical Technology). Kafedra khimii i tekhnologii redkikh i rasseyannykh elementov (Department of the Chemistry and Technology of Rare and Dispersed Elements)

SUBMITTED: July 1, 1959

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S/153/60/003/003/010/036/XX
B016/B058

AUTHORS: Korshunov, B. G., Morozov, I. S., Ionov, V. I.

TITLE: Study of the Interaction of the Chlorides of Rare Earths With the Chlorides of the Alkaline-earth- and Alkali Metals in Melts. Thermal Analysis of the System $CeCl_3$ - $CaCl_2$ - NaCl

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1960, Vol. 3, No. 3, pp. 402 - 404

TEXT: The authors report on the thermographic analysis of the fusibility of the two binary systems $CeCl_3$ - $CaCl_2$ and $CeCl_3$ - NaCl in the ternary system $CeCl_3$ - $CaCl_2$ - NaCl. The nonvolatile melt which develops on treating loparite raw material by means of the chlorine method, is composed of these three chlorides. The chlorides dehydrated by the authors were molten in quartz-glass containers according to Stepanov (not described in the text). Apart from the two binary systems, the authors

Study of the Interaction of the Chlorides of Rare Earths With the Chlorides of the Alkaline-earth- and Alkali Metals in Melts. Thermal Analysis of the System $CeCl_3$ - $CaCl_2$ - NaCl

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B016/B058

studied four inner sections, the directions of which are mentioned in the Fig. on p. 404. On the basis of their results, the authors state that three crystallization fields of $CeCl_3$, $CaCl_2$, and NaCl exist on the liquidus surface. The components of all the three systems mentioned form a fusibility diagram of the eutectic type. The ternary eutectic consists of $CeCl_3$ 12.2; $CaCl_2$ 38.8, NaCl 49.0 (in mole%) and crystallizes at 440°C. The eutectics $CeCl_3$ - $CaCl_2$ and $CeCl_3$ - NaCl contain (in mole%): 55.0 and 32.5 $CeCl_3$, respectively, and melt at 618° and 488°C, respectively. There are 1 figure, 1 table, and 6 references: 4 Soviet, 1 British, and 1 German.

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Study of the Interaction of the Chlorides of Rare Earths With the Chlorides of the Alkaline-earth- and Alkali Metals in Melts. Thermal Analysis of the System $CeCl_3$ - $CaCl_2$ - NaCl

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B016/B058

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova; Kafedra tekhnologii redkikh i rasseyanykh elementov (Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; Chair of Technology of Rare and Disperse Elements)

SUBMITTED: November 5, 1958

Fig.

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S/149/60/000/005/004/015
A006/A001

AUTHORS: Korshunov, V.G., Morozov, I.S., Ionov, V.I. and Zorina, M.A.

TITLE: Physical and Chemical Studies of the $AlCl_3$-$FeCl_3$-NaCl System

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No. 5, pp. 67-71

TEXT: The authors studied the interaction of aluminum, iron and sodium chlorides by the method of thermal and tensiometric analysis for the purpose of developing chemical and physical bases for the refining of chlorides of titanium and other metals. The necessary aluminum and iron chlorides were obtained by chlorination with gaseous chlorine of the respective metals; sodium chloride was preliminary remelted. Melting temperatures of the chlorine salts of aluminum, iron and sodium were 194, 303 and 800°C respectively. Due to the fact that aluminum and iron chlorides have high vapor tensions at their melting temperatures, different mixtures of the system were melted in molybdenum or quartz glass Stepanov containers. The thermal analysis of the system was made by recording the cooling curves on a N.S. Kurnakov type pyrometer. The temperature was measured with a nichrome-constantan thermocouple, graduated according to con-

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A006/A001

Physical and Chemical Studies of the $AlCl_3$-$FeCl_3$-NaCl System

ventional datum points. The ternary system was studied by investigating six internal sections (Figure 1), whose direction was mainly determined by the location of non-variable equilibrium points on the lateral binary diagrams. The compositions are expressed in mole percent. The tensiometric analysis was made to confirm the results of the thermal analysis of the system and to investigate the vapor tension of $NaAlCl_4$ and $NaFeCl_4$ compounds during their joint presence under conditions of sodium chloride excess. Vapor tension was determined in chlorine atmosphere by the dynamic method. The formation of a $NaFeCl_4$ compound in the $FeCl_3$-NaCl system and its vapor tension were determined. The results of tensiometric analysis are given in a table. The fusibility diagram plotted may be used for calculations connected with the purification of chlorides of titanium and other elements from aluminum and iron chlorides by means of sodium chloride.

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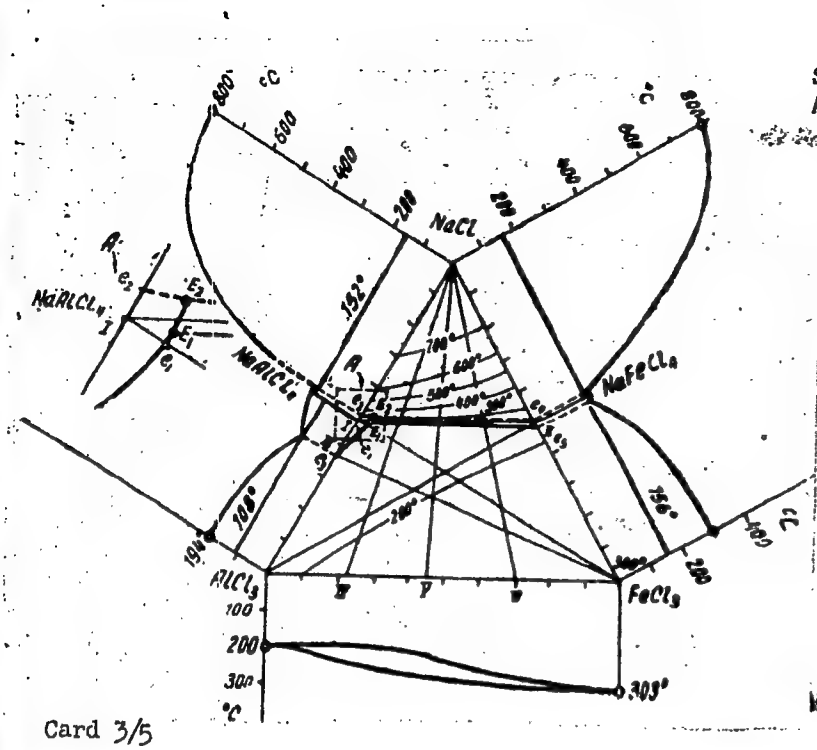

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Fig. 1
Fusibility diagram
of the $AlCl_3$-$FeCl_3$-NaCl
System

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Physical and Chemical Studies of the $AlCl_3$-$FeCl_3$-NaCl System

Results of the tensiometric analysis of three mixtures of the $AlCl_3$-$FeCl_3$-NaCl system

No. No. of mixtures	Temperature, °C	Vapor tension, mm Hg	
		$NaAlCl_4$	$NaFeCl_4$
1	500	0,0	0,0
	530	0,2	2,2
	586	1,2	11,8
	620	2,6	15,9
	650	5,1	21,4
	670	6,7	25,0
2	362	0,0	0,0
	423	0,9	2,2
	477	1,2	5,9
	558	3,5	12,9
	590	4,7	21,1

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A006/A001

Physical and Chemical Studies of the $AlCl_3$-$FeCl_3$-NaCl System

No. No. of mixtures	Temperature, °C	Vapor tension, mm Hg	
		Al_2Cl_6	Fe_2Cl_6
3	150	32,0	1,1
	161	67,2	3,3
	173	129,0	4,9
	184	272,8	6,1

There are 2 figures, 1 table and 22 references: 12 Soviet, 6 English, 2 French and 2 German.

ASSOCIATIONS: Moskovskiy institut tonkoy khimicheskoy tekhnologii (Moscow Institute of Fine Chemical Technology), Kafedra khimii i tekhnologii redkikh i rasseyannykh elementov (Department of Chemistry and Technology of Rare and Dispersed Elements)

SUBMITTED: October 27, 1959

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S/078/60/005/06/09/030
B004/B014

AUTHORS: Ionov, V. I., Morozov, I. S., Korshunov, B. G.

TITLE: Thermal Analysis of the Systems $NdCl_3$ - $FeCl_2$, $FeCl_2$ - NaCl, $FeCl_2$ - KCl, $FeCl_2$ - CsCl, and $NdCl_3$ - $FeCl_2$ - KCl

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 6, pp. 1248 - 1253

TEXT: The authors specify the following data obtained from experiments: melting-point diagram of the system $NdCl_3$ - $FeCl_2$ with a eutectic at 608°C and 59.8 mole % $FeCl_2$ (Fig. 1); melting-point diagram of the system $FeCl_2$ - NaCl with a eutectic at 370°C and 44 mole % $FeCl_2$ (Fig. 2); melting-point diagram of the system $FeCl_2$ - KCl (Fig. 3). The compounds $KFeCl_3$ (α- and β-modification) and K_2FeCl_4 are formed in the latter. The

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Thermal Analysis of the Systems $NdCl_3$ - $FeCl_2$, $FeCl_2$ - NaCl, $FeCl_2$ - KCl, $FeCl_2$ - CsCl, and $NdCl_3$ - $FeCl_2$ - KCl

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B004/B014

eutectic $KFeCl_3$+K_2FeCl_4 melts at 340°C and corresponds to a content of 39.8 mole % $FeCl_2$. The eutectic $KFeCl_3$+$FeCl_2$ melts at 380°C with a content of 52.2 mole % $FeCl_2$. In the system $FeCl_2$ - CsCl (Fig. 4), the compounds $CsFeCl_3$ and Cs_2FeCl_4 arise with the eutectics Cs_2FeCl_4+CsCl (508°, 21.4 mole % $FeCl_2$), $CsFeCl_4$+$CsFeCl_3$ (522°, 38.0 mole % $FeCl_2$), and $CsFeCl_3$+$FeCl_2$ (498°C, 69.3 mole % $FeCl_2$). Hence, the thermal stability of compounds of $FeCl_2$ with alkali chlorides increases from Na to Cs. Eight sections were examined in the system $NdCl_3$ - $FeCl_2$ - KCl (Figs. 5-11). The melting-point diagrammatically shown in Fig. 12 was constructed on the strength of these results. Numerous conversions were detected below the liquidus surface. Data on the four ternary eutectic points and one

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Thermal Analysis of the Systems $NdCl_3$ - $FeCl_2$, $FeCl_2$ - NaCl, $FeCl_2$ - KCl, $FeCl_2$ - CsCl, and $NdCl_3$ - $FeCl_2$ - KCl

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B004/B014

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ternary peritectic point are supplied. There are 12 figures and 4 references: 2 Soviet and 2 American.

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A006/A001

21,3000

AUTHORS: Korshunov, B. G., Ionov, V. I., Baklashova, T. A., Kokorev, V. V.

TITLE: An Investigation of Interactions Between Thorium Chlorides and Chlorides of Magnesium, Calcium, Cerium, Aluminum, Iron, Niobium, Tantalum and Oxychloride of Niobium in Melts

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No. 6, pp. 114-118

TEXT: The extended use of chlorine methods for processing complex rare-element raw materials containing thorium, requires a study of the systems with the participation of thorium chloride. The authors carried out thermal and tensiometrical analyses to investigate the interaction of components in the following systems: $ThCl_4$ - $MgCl_2$, $ThCl_4$ - $CaCl_2$, $ThCl_4$ - $CeCl_3$, $ThCl_4$ - $AlCl_3$, $ThCl_4$ - $FeCl_3$, $ThCl_4$ - $NbCl_5$, $ThCl_4$ - $TaCl_5$, $ThCl_3$ - $FeCl_3$ - $NbCl_5$ and $ThCl_4$ - $NbOCl_3$. The chlorides were obtained as follows: chloride of thorium by chlorinating a mixture of thorium dioxide and charcoal from sugar with gaseous chlorine at 1000°C; chlorides of aluminum, iron and tantalum were prepared by chlorination of metals; chlorides of magnesium, calcium and cerium were obtained by the method indicated

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An Investigation of Interactions Between Thorium Chlorides and Chlorides of Magnesium, Calcium, Cerium, Aluminum, Iron, Niobium, Tantalum and Oxychloride of Niobium in Melts

in reference 5, and oxychloride of niobium by a method described in reference 6. The thermal analysis of the systems was made by the method of fusibility; the curves were recorded on a N. S. Kurnakov pyrometer. The $ThCl_4$ - $MgCl_2$, $ThCl_4$ - $CaCl_2$ and $ThCl_4$ - $CeCl_3$ systems have a fusibility diagram of the eutectic type (Figure 1). The eutectics contain 55.0 molecular % (82.8 weight %), 46.0 mol. % (74.2 weight %) and 60.6 mol. % (70.0 weight %) $ThCl_4$ respectively and melt at 610, 560 and 640°C. To confirm data obtained by thermal analysis and to reveal the possibility of separating and refining the chlorides, the authors carried out a tensiometric study of the aforementioned systems based on the measurement of vapor tensions over the systems, which were determined by the "flow" method. Chlorine was used as a carrier gas. Thorium in the sublimate was determined by a method given in Ref. 8 and 9 and the other elements by conventional methods. The method of tensiometry has been described in Ref. 10. The absence of a chemical reaction between the components and the difference in the vapor tensions can be used for the separation of chlorides by distillation.

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An Investigation of Interactions Between Thorium Chlorides and Chlorides of Magnesium, Calcium, Cerium, Aluminum, Iron, Niobium, Tantalum and Oxychloride of Niobium in Melts

The results of the tensiometric investigation are given below:

System	Content of $ThCl_4$ in the mixture in mol. %	°C	Vapor tension over the system $lgP = -\frac{A}{T} + B$, mm Hg		
			A	B	for chlorides
$ThCl_4 - MgCl_2$	22.9	700 - 820	6260	6.84	$ThCl_4$
$ThCl_4 - CaCl_2$	54.0	575 - 819	7210	8.26	"
$ThCl_4 - CeCl_3$	40.5	725 - 895	5700	6.63	
$ThCl_4 - AlCl_3$	27.9	114 - 152	5020	13.7	Al_2Cl_6
$ThCl_4 - FeCl_3$	[illegible]	228 - 277	5825	12.5	Fe_2Cl_6
$ThCl_4 - NbCl_5$	[illegible]	105 - 188	3390	9.16	$Nb Cl_5$
$ThCl_4 - [illegible]$	[illegible]	[illegible]	3660	8.5	$NbOCl_3$
$ThCl_4 - [illegible]$	49.0	110 - 192	3710	9.90	$TaCl_5$

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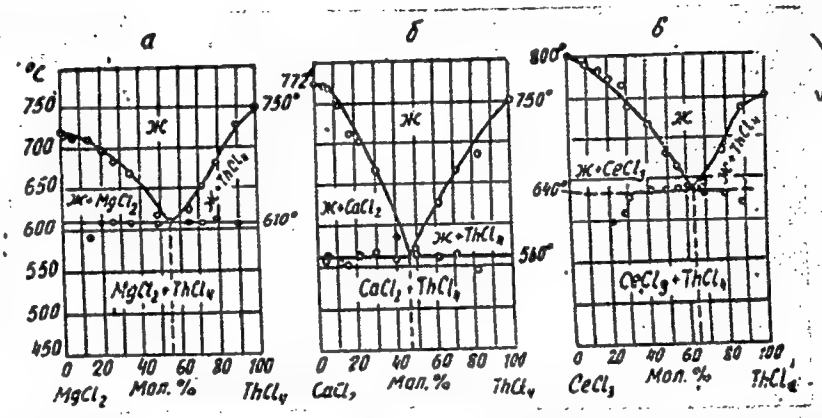
An Investigation of Interactions Between Thorium Chlorides and Chlorides of Magnesium, Calcium, Cerium, Aluminum, Iron, Niobium, Tantalum and Oxychloride of Niobium in Melts

Figure 1:
Fusibility diagram of the systems $ThCl_4$ - $MgCl_2$ (a); $ThCl_4$ - $CaCl_2$ (b) and $ThCl_4$ - $CeCl_3$ (c).



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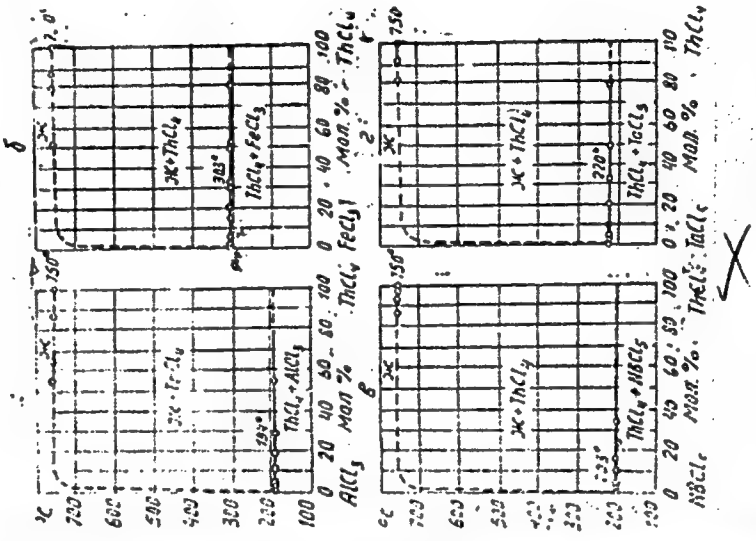
An Investigation of Interactions Between Thorium Chlorides and Chlorides of Magnesium, Calcium, Cerium, Aluminum, Iron, Niobium, Tantalum and Oxychloride of Niobium in Melts.

Figure 2:
Solubility diagram of the systems: $ThCl_4$ - $AlCl_3$ (a), $ThCl_4$ - $FeCl_3$ (b), $ThCl_4$ - $NbCl_5$ (c), and $ThCl_4$ - $TaCl_5$ (d).



There are 4 figures and 10 references: 6 Soviet, 2 French, 1 German, 1 English

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A006/A001

An Investigation of Interactions Between Thorium Chlorides and Chlorides of Magnesium, Calcium, Cerium, Aluminum, Iron, Niobium, Tantalum and Oxychloride of Niobium in Melts

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii (Moscow Institute of Fine Chemical Technology) Kafedra khimii i tekhnologii redkikh i rasseyannykh elementov (Department of Chemistry and Technology of Rare and Dispersed Elements)

SUBMITTED: January 28, 1960

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S/149/61/000/001/003/013
A006/A001

AUTHORS: Korshunov, B.G., Ionov, V.I.

TITLE: Study of Fusibility of the $NiCl_3$-$TiCl_2$-NaCl System

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1961, No. 1, pp. 77 - 81

TEXT: Previous studies (Ref. 1, 2, 3, 4) on titanium refining by electrolysis using crude Ti as soluble anodes, do not contain indications on the optimum composition of the electrolyte, due to the lack of information on its physico-chemical properties. The authors investigated the most important physico-chemical properties of the $TiCl_3$-$TiCl_2$-NaCl system. Fusibility of the system was as yet not studied but its components binary systems, had been investigated by a number of authors. Data on the $TiCl_2$-NaCl system had been submitted by K. Komarek and P. Gerasymenko (Ref. 5); the $TiCl_3$-NaCl system has been studied by V.M. Kamenetskiy (Ref. 6), B.F. Markov and R.V. Chernov (Ref. 7), P. Ehrlich, G. Kaupa, K. Blankenstein (Ref. 8), and M. Farber, A.J. Darnell, F. Brown (Ref. 9). The results obtained by the aforementioned authors disagree with regard to crystallization from melts for mixtures containing over 25 mol % $TiCl_3$. The authors of the present

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Study of Fusibility of the $NiCl_3$-$TiCl_2$-NaCl System

article studied fusibility of the $TiCl_3$-NaCl system and of the $TiCl_3$-$TiCl_2$-NaCl system within the concentration range of lower titanium chlorides determined by the electrolyte composition for Ti refining. Trichloride of Ti was obtained by reducing tetrachloride of Ti with Ti metal by a method described in Ref. 10. Sodium chloride was preliminarily remelted. Investigations of fusibility were carried out by the method of thermal analysis; the curves were registered on a N.S. Kurnakov type pyrometer. The temperature was measured with a platinum-platinum rhodium thermocouple. Melting of the salt system was performed in Stepanov's quartz glass and in stainless steel containers. The salt mixtures were prepared by a method described in Reference 7. Cooling curves were obtained for molten mixtures containing up to 49.8 mol % (72.4 weight %) $TiCl_3$. Results of thermal analysis, given in a diagram, are in agreement with data of Reference 8 and differ considerably from data of Reference 7 at a $TiCl_3$ concentration of over 25 mol.%. This is explained by the imperfect investigation method employed by Markov and Chernov, who melted the mixtures in open crucibles. According to data obtained by the present investigation, the components of the system form an incongruently melting Na_3TiCl_6 chemical compound; the temperature of peritectic transformation is 543°C. Eutectics, formed by the chemical compound and titanium trichloride, has a composition of 43 mol% $TiCl_3$ and 57% NaCl, and melts at 460°C. All the mixtures

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Study of Fusibility of the $TiCl_3$-$TiCl_2$-NaCl System

contained, after their melting, titanium dichloride whose content increased with a higher amount of titanium trichloride and attained 4 - 5% in weight. This shows that the system is not a strictly binary one. Fusibility of the ternary $TiCl_3$-$TiCl_2$-NaCl system was studied within a small range of lower titanium chloride concentrations. Previous studies had shown that in alkali metal melts, containing lower Ti chlorides, an equilibrium between bi- and trivalent titanium was established. Therefore samples of the following composition were used to compose the salt mixtures:

	$TiCl_3$	$TiCl_2$	NaCl
Sample 1	62.2	6.7	31.1
Sample 2	6.4	12.9	80.7

Sample 1 was prepared by sodium-thermal reduction of titanium tetrachloride in an amount required to obtain Ti trichloride. Sample 2 was obtained by sodium thermal reduction of titanium tetrachloride calculated to obtain Ti dichloride with subsequent dilution of the reduction product by sodium chloride. Results of thermal analysis and literature data on $TiCl_2$-NaCl were used for the partial plotting of

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Study of Fusibility of the $TiCl_3$-$TiCl_2$-NaCl System

the liquidus surface of the $TiCl_3$-$TiCl_2$-NaCl system (see diagram), which could only be obtained for the vertex of chlorous sodium if the $TiCl_3$ content in the mixture did not exceed 50 mol %. Data on the type of a phase diagram of the $TiCl_3$-$TiCl_2$ system do not exist in literature. The boundary lines of the liquidus surface are approximate. The lowest melting temperature (about 443°C) is shown by a composition of 40 mol%. $TiCl_3$, 7% $TiCl_2$ and 53% NaCl. The phase diagram obtained of the $TiCl_3$-$TiCl_2$-NaCl system can be used to determine the temperature of beginning crystallization of electrolytes employed for the refining of titanium.

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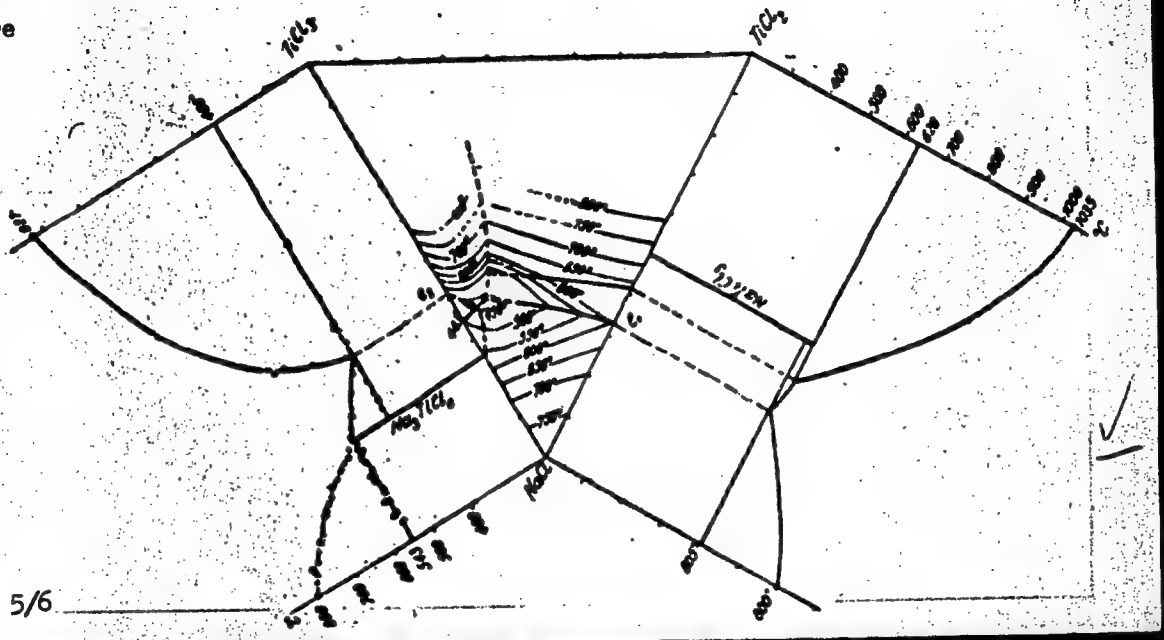
Study of Fusibility of the $TiCl_3$-$TiCl_2$-NaCl System

Figure



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Study of Fusibility of the $TiCl_3$-$TiCl_2$-NaCl System

Figure:

Liquidus surface of the $TiCl_3$-$TiCl_2$-NaCl system

Data given by

X - Kamenetskiy
O - Markov and Chernov
Δ - Ehrlich and others
• - the authors of the present article.

There are 1 figure and 19 references: 9 Soviet, 6 English, 3 German and 1 Japanese.

ASSOCIATIONS: Moskovskiy institut tonkoy khimicheskoy tekhnologii (Moscow Institute of Fine Chemical Technology); Kafedra khimii i tekhnologii redkikh i rasseyanykh elementov (Department of Chemistry and Technology of Rare and Dispersed Elements)

SUBMITTED: April 15, 1960

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S/149/61/000/002/010/017
A006/A001

AUTHORS: Korshunov, B.G., Ionov, V.I.

TITLE: Investigating the Density, Viscosity and Electric Conductivity of the $TiCl_3$ - $TiCl_2$ - NaCl System

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1961, No. 2, pp. 102 - 106

TEXT: The authors studied density, viscosity and electric conductivity of melts of lower titanium and sodium chlorides, used as electrolyte in titanium refining. To determine the density of the $TiCl_3$-$TiCl_2$-NaCl system the authors used the equipment and method described in Reference 4. The composition of the salt mixtures was based on samples of composition: 1) :62.2% $TiCl_3$, 6.7% $TiCl_2$, and 3.1% NaCl and 2) - 6.4% $TiCl_3$, 12.9% $TiCl_2$ and 80.7% NaCl, obtained by sodium-thermal reduction of titanium tetrachloride and subsequent dilution of the reduction product with sodium chloride. In the $TiCl_3$-$TiCl_2$-NaCl system the density of melts was studied which contained 2.5; 4.0; 6.8; 7.2; 9.1 and 21.85 weight % of total soluble titanium, in the 850-1,050°C temperature range with intervals of 50°C. Simultaneously, the density of NaCl melts was determined. It appeared that

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A006/A001

Investigating the Density, Viscosity and Electric Conductivity of the $TiCl_3$-$TiCl_2$-NaCl System

the density of melts in the system fluctuated from 1.430 g/cm^3 for NaCl at 1,050°C to 1,833 g/cm^2 for a mixture with 21.85% Ti_{total} at 850°C. At equal temperatures, the density of melts increased with a higher content of Ti_{total}. Results are given in Table 1. The density of solidified specimens at 20°C was determined with the aid of benzine (specific weight 0.747 g/cm^3). Density increased with higher total Ti content wand was 2.115 g/cm^3 for NaCl and 2.352 g/cm^3 for a melt containing 21.85% Ti_{tot}. Density of Ti chlorides (according to Ref. 5) is 2.65 g/cm^3 for $TiCl_3$ and 3.13 g/cm^3 for $TiCl_2$. The results show that the density of the system increases with a higher content of titanium tetrachloride. The viscosity of the system was determined by the method of a torsion pendulum. The material was placed in a crucible and in a electric furnace under whose roof dry argon current was switched on. The stainless steel balls (65 - 75 g weight) of the torsion pendulum were suspended on a molybdenum thread of 0.104 diameter and 120 mm length. Preliminary determinations were made of logarithmic decrements in air and liquids of known density and viscosity (water and molten sodium chloride). The viscosity of a melt with 7.2% total titanium content (6.4% $TiCl_3$; 12.9% $TiCl_2$; 80.7% NaCl)

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at 800°C was 0.028 poise. Elevation of temperature entailed the accumulation of solid oxide particles in the melts and distortion of results. As a rule, the viscosity of molten salts decreases rapidly with higher temperatures, which corresponds to a reduced interaction force of salt ions. A slight decrease of viscosity was observed at a lower concentration of lower titanium chlorides; this is in agreement with the concepts on the effect of the mobility of cations on the viscosity of melts. Electroconductivity of the system was studied on melts containing up to 9.2% titanium chlorides, in the 820 - 950°C range. The method and equipment, described in Reference 6, were used. It was found that the electroconductivity of the system decreased at the given temperatures at a concentration of titanium chlorides raised from 0 to 9.2%, and increased with higher temperatures. The results must however be considered as approximate, since it was stated that the platinum electrodes employed for the experiments were partially dissolved in the electrolyte.

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Investigating the Density, or Viscosity and Electric Conductivity of the $TiCl_3$-$TiCl_2$-NaCl System

Table 1: Results of measuring the density in the $TiCl_3$-$TiCl_2$-NaCl System

Состав системы, вес. % a				Плотность расплава (г/см³) при температуре b					Значения коэффициента a в зависимости $d_t = d_{850} - a(t-850)$ c
$TiCl_3$	$TiCl_2$	NaCl	$Ti_{общ}$	850°	900°	950°	1000°	1050°	
—	—	100,0	—	1,527	1,502	1,478	1,454	1,430	$4,85 \cdot 10^{-4}$
2,2	4,5	93,3	2,5	1,549	1,522	1,495	1,468	1,440	$5,45 \cdot 10^{-4}$
3,6	7,2	89,2	4,0	1,570	1,541	1,510	1,482	1,455	$5,07 \cdot 10^{-4}$
6,1	12,2	81,7	6,8	1,599	1,572	1,545	1,520	1,486	$5,65 \cdot 10^{-4}$
6,4	12,9	80,7	7,2	1,604	1,577	1,552	1,527	1,498	$5,3 \cdot 10^{-4}$
8,1	16,3	75,6	9,1	1,628	1,600	1,588	1,540	1,511	$5,85 \cdot 10^{-4}$
62,2	6,7	31,1	21,85	1,833	1,750	1,660	1,600	1,545	$1,42 \cdot 10^{-3}$

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Investigating the Density, Viscosity and Electric Conductivity of the $TiCl_3$-$TiCl_2$-NaCl System

Table 1:

a) Composition of system in weight %
b) Density of melt (g/cm^3) at temperature
c) Value of coefficient a in relation: $d_t = d_{850} - a(t - 850)$
d) Density at 20 C g/cm^3.

There are 2 tables and 6 references: 3 Soviet and 3 non-Soviet.

ASSOCIATIONS: Moskovskiy institut tonkoy khimicheskoy tekhnologii (Moscow Institute of Fine Chemical Technology). Kafedra khimii i tekhnologii redkikh i rasseyannykh elementov (Department of Chemistry and Technology of Rare and Dispersed Elements)

SUBMITTED: June 26, 1960

Табл 1 cont.

Плотность при 20°, г/см³ d	2,115	2,126	2,138	2,163	2,184	2,201	2,252

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VOLYNSKIY, Aleksandr Yakovlevich; BAZILEV, N.P., nauchn. red.; SIROTINA, S.L., red.; IONOV, V.I., red.

[Foundry molds and their assembly] Liteinye formy i ikh sborka. Moskva, Vysshaia shkola, 1964. 290 p. (MIRA 17:10)

(A,N) L 11605-66

ACC NR: AP6000343 SOURCE CODE: UR/0286/65/000/021/0038/0039

AUTHORS: Koryukin, V. I.; Moreynis, I. Sh.; Delov, V. I.; Ionov, V. I.

ORG: none

TITLE: A device for recording angular displacements, velocities, and accelerations in the joints of extremities or in hinges of prostheses and orthopedic apparatuses. Class 30, No. 176036 [announced by the Central Scientific Research Institute for Prosthesis Design and Manufacture (Tsentral'nyy nauchno-issledovatel'skiy institut protezirovaniya i protezostroyeniya)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 21, 1965, 38-39

TOPIC TAGS: orthopedic equipment, hospital equipment

ABSTRACT: This Author Certificate describes a device for recording angular displacements, velocities, and accelerations in the joints of extremities or in hinges of prostheses and orthopedic apparatuses. The device contains differentiating RC circuits and variable resistors linked with the hinge jaws (see Fig. 1). To obtain a simultaneous recording of the angular displacements, angular velocity, and angular acceleration by a single recorder, the device contains a single potentiometer with leads from the hinge jaws. The latter are made from a plastic material in the

Card 1/2 UDC: 616-073.753.3

L 11605-66

ACC NR: AP6000343

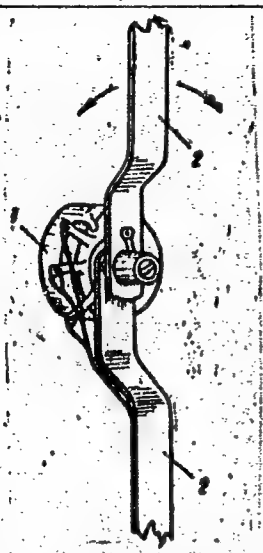

Fig. 1. 1 - Potentiometer; 2 - busbars.

form of a busbar. Orig. art. has: 1 figure.

SUB CODE: 06/ SUBM DATE: 08Jul64

Card 2/2

INDIKOV, E.M.; IONOV, V.I.; SOLOVKIN, A.S.; TETERIN, E.G.; SHESTERIKOV, N.N.

Demixing in the system $HClO_2$ - H_2O - tri-n-butyl phosphate - diluent. Zhur.neorg.khim. 10 no.11:2569-2571 N '65. (MIRA 18:12)

1. Submitted December 16, 1964.

IONOVA, V.K.

Pathomorphological changes following alimentary introduction of silicon dust. Trudy Inst.kraev.pat. AN Kazakh.SSR. 10:24-29 '62. (MIRA 16:5)

(LUNGS—DUST DISEASES) (ALIMENTARY CANAL—DISEASES)

IGNOT, V. I.

"An Application of Variational Methods to the Solution of Several Problems in the Space Theory of Elasticity in Cylindrical Coordinates." Cand Phys-Math Sci, Sci Res Inst of Mechanics and Mathematics, Moscow State U, Moscow, 1953. Dissertation (Referativnyy Zhurnal--Matematika Moscow, Feb 54)

SO: SUM 186, 19 Aug 1954

IONOV, V.N.

Equilibrium of an elastic thin-walled pipe subjected to internal pressure applied to a 2c. length section. Vest.Mosk.un.11 no.5: 13-24 My '56. (MLRA 9:10)

1.Kafedra teorii uprugosti.
(Strains and stresses) (Pipe--Hydrodynamics)

SOV/124-58-3-3133

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 3, p 83 (USSR)

AUTHOR: Ionov, V. N.

TITLE: The Equilibrium of an Elastic Cylinder of Finite Length (Ravnovesiye uprugogo tsilindra konechnoy dliny)

PERIODICAL: V sb.: Issledovaniya po teorii sooruzheniy. Nr 7, Moscow, Gosstroyizdat, 1957, pp 413-436

ABSTRACT: The paper discusses the problem of the elastic equilibrium of a hollow cylinder of finite length. Following the method of M.M. Filonenko-Borodich (Prikl. matem. i mekhan., 1951, Vol 15, Nr 2), the author constructs a stress tensor consisting of three tensors, namely, the fundamental, the supplementary, and the corrective tensors. The components of the fundamental tensor must satisfy the equilibrium equations in the absence of body forces and the given end conditions on the surface of the cylinder; several specific instances of surface loads are discussed: 1) Normal face stresses, 2) tangential face stresses, and 3) inner and outer pressure. The supplementary stress tensor is a special solution of the equation of equilibrium which leaves the cylinder surface free from stresses; a supplementary

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SOV/124-58-3-3133

The Equilibrium of an Elastic Cylinder of Finite Length

tensor is constructed for the centrifugal force and for the gravity force. The corrective tensor satisfies the uniform equations of equilibrium and the uniform end conditions of the cylindrical surface and contains a number of arbitrary constants which are determined from the condition of minimum potential energy (the suggested solution does not satisfy Castigliano's theorem of compatibility). The author suggests that the corrective tensor be constructed in the form of a triple series of the products of cosine-binomes and plain trigonometrical functions of the variables r, ϑ, and z.

V. K. Prokopov

Card 2/2

IONOV, V.N., kand.fiz.-mat.nauk, dots.

Thermal stresses in an elastic cylinder. Izv.vys.ucheb.zav.: mashinostr. no.6:75-80 '58. (MIRA 12:8)

1. Moskovskoye vysshoye tekhnicheskoye uchilishche im. Baumana.
(Thermal stresses) (Cylinders)

IONOV, V.N.

Calculating stresses in a shell of revolution having a nonzero curvature. Nauch. dokl. vys. shkoly; mash. i prib. no.2:78-85 '59. (MIRA 12:12)

(Elastic plates and shells)

IONOV, V.N.

Equilibrium of bodies of revolution. Nauch.dokl.vys.shkoly; fiz.-mat.nauki no.3:87-98 '59. (MIRA 13:6)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Geometry, Solid) (Body of revolution)

IONOV, V. N., Doc Phys-Math Sci -- (diss) "Application of the principle of possible variations in a condition of strain in solving spacial problems of elasticity and plasticity." Moscow, 1960. 11 pp; (Moscow State Univ im M. N. Lomonosov); 200 copies; price not given; (KL, 31-60, 140)

IONOV, V.N., kand.tekhn.nauk, dotsent

Solving three-dimensional problems. Izv.vys.ucheb.zav.; mashinostr. no.1:3-9 '60. (MIRA 14:5)

1. Moskovskoye vysshoye tekhnicheskoye uchilishche imeni Baumana.
(Elasticity) (Plasticity)

24.4200 1103, 1327

27850
S/508/60/029/000/006/012
D225/D303

AUTHOR: Ionov, V.N. (Moscow)

TITLE: On the pressure-deformed state of shells with null curvature

PERIODICAL: Akademiya nauk SSSR, Inzhenernyy sbornik, v. 29, 1960, 63-76

TEXT: The aim of the paper is to establish a method for calculating pressure-deformed states for shells with null curvature, based on the variation principle of the minimum of energy of deformation. The author introduces the following system of coordinates x - distance along the tracing line from the zero until the treated cross section (Fig. 1). φ - the angle which determines the position of the point on the parallel circle, z - distance along the normal to the meab surface of the shell. The component of the metric tensor will then be

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On the pressure-deformed ...

$$g_{11} = 1;\ g_{22} = (r_0 + x \sin\alpha + z\cos)^2;\ g_{33} = 1 \qquad (2)$$

differing from zero, Christoffel's symbols have the following form: $\Gamma^1_{22} = \alpha - \sin\alpha\,(r_0 + x\sin\alpha + z\cos\alpha)$; $\Gamma^3_{22} = -\cos\alpha\,(r_0 + x\sin\alpha + z\cos\alpha)$,

$$\Gamma^2_{12} = \frac{\sin\alpha}{r_0 + x\sin\alpha + z\cos\alpha};\ \Gamma^2_{23} = \frac{\cos\alpha}{r_1 + x\sin\alpha + \cos\alpha}, \qquad (3)$$

$$\Gamma^2_{22} = \frac{\frac{\partial}{\partial\varphi}(r_0 + x\sin\alpha)}{r_0 + x\sin\alpha} + \frac{z\frac{\partial}{\partial\varphi}\left(\frac{\cos\alpha}{r_0 + x\sin\alpha}\right)(r_0 + x\sin\alpha)}{r_0 + x\sin\alpha + z\cos\alpha}.$$

The coordinates therefore change in the range

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$$0 \leqslant x \leqslant H,$$
$$0 \leqslant \varphi \leqslant 2\pi,$$
$$-h \leqslant z \leqslant h$$

The external acting forces were given by vector $\bar{F}$ with the potential

$$\varphi = \frac{1}{4\pi} \int_{\Omega} F^{\alpha} \left(\frac{1}{\xi}\right)_{\alpha} d\tau \qquad (4)$$

for the body forces, and by values $p_{(ik)}$ for surface forces; the P_{ik} are connected with components P^{ik} of tensor of surface forces by

$$p^{ik} = \sqrt{g^{ii} g^{kk}}\, P_{(ik)} \qquad (5)$$

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On the pressure-deformed ...

A form is given for the relation between components of pressure-tensor σ and deformation tensor ε which was assumed for small deformation. The components of the pressure tensor have to satisfy: a) the equation of equilibrium, b) boundary conditions for pressures or boundary conditions for displacements, c) variation equations for either of the previous boundary conditions under b). The components σ^{ik} of the pressure-tensor were represented as a sum

$$\sigma^{ik} = \sigma^{ik}_{(o)} + \sigma^{ik}_{(k)} \qquad (14)$$

where $\sigma^{ik}_{(o)}$ means the main pressure tensor of the shell, and $\sigma^{ik}_{(k)}$ the correcting pressure-tensor. To construct σ_o and σ_k the general solution of stability equations was used which in this case has the form of

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On the pressure-deformed ...

$$\sigma^{ik} = -2\rho g^{ik} + \frac{1}{2}\left(g^{iv}g^{k\mu} - \frac{1}{2}g^{ik}g^{v\mu}\right)g^{\alpha\lambda}\widetilde{R}_{\lambda v\mu\alpha} \qquad (15)$$

For $x = x_1 = 0$, the equations to be solved have the form

$$\begin{aligned}
&\frac{\partial^2 F_{21}}{\partial\varphi\,\partial z} - \Gamma^1_{22}\frac{\partial F_{21}}{\partial z} - \Gamma^2_{22}\frac{\partial F_{21}}{\partial z} = g_{22}Q^{11}_{(1)},\\
&\frac{\partial}{\partial z}\left(\frac{\partial F_{11}}{\partial z} - \frac{\partial F_{21}}{\partial\varphi}\right) + 2\Gamma^2_{12}\frac{\partial F_{21}}{\partial z} - \Gamma^2_{22}\left(\frac{\partial F_{11}}{\partial z} - \frac{\partial F_{21}}{\partial\varphi}\right) = 2g_{22}Q^{12}_{(1)}, \qquad (16)\\
&\frac{\partial}{\partial\varphi}\left(\frac{\partial F_{11}}{\partial z} - \frac{\partial F_{21}}{\partial\varphi}\right) + \Gamma^2_{22}\left(\frac{\partial F_{11}}{\partial z} - \frac{\partial F_{21}}{\partial\varphi}\right) = -2g_{22}Q^{13}_{(1)}.
\end{aligned}$$

where $Q^{ik}_{(v)}$ (v=1,2) are the force functions. The solutions ob-

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tained were of the form F_{31} =

$$F_{31} = \int_{-h}^{z} \frac{r_0 + z \cos \alpha}{2 \sin \alpha} P_1 dz \qquad (22)$$

F_{21}=

$$F_{21} = \int_{-h}^{z} \frac{-1}{\sin \alpha (r_0 + z \cos \alpha)} \left\{ \frac{\partial}{\partial \varphi} \left(\frac{(r_0 + z \cos \alpha)}{2 \sin \alpha} P_1 \right) - \frac{r_0 + z \cos \alpha}{2 \sin \alpha} \Gamma_{22}^{2} P_1 - \right.$$

$$\left. - 2 (r_0 + z \cos \alpha)^2 Q_{(11)}^{11} \right] dz. \qquad (24)$$

and F_{11} =

$$F_{11} = \int_{-h}^{z} \left(f_1 + \frac{\partial F_{21}}{\partial \varphi} \right) dz \qquad (25)$$

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On pressure-deformed ... ...

For $x = x_2 = H$, similar results were obtained for functions Φ_{31}, Φ_{21}, Φ_{11} and similar results by changing index (1) into index (2). By substituting these values into

$$\prod_{i1}^{(o)} = \frac{1}{2}(1+\cos\bar{x})\,F_{i1} + \frac{1}{2}(1-\cos\bar{x})\Phi_{i1} \qquad (27)$$

one obtains the pressure functions $\prod_{i1}^{o}$. The same procedure was applied to the cases $z = z_1 = -h$, and $z = z_2 = h$ and functions F_{13}, F_{23}, F_{33} as well as Φ_{13}, Φ_{23}, Φ_{33} were determined and similar functions by changing index (1) into index (2). Pressure functions $\prod_{i}^{(o)}$ for the main tensor were given by

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On pressure-deformed ...

$$\prod_1^{(o)} = \frac{1}{2}(1+\cos\bar{x})F_{i1} + \frac{1}{2}(1-\cos\bar{x})\Phi_{i1} + \\ + \frac{1}{2}(1+\cos\bar{z})F_{i3} + \frac{1}{2}(1-\cos\bar{z})\Phi_{i3} \qquad (39)$$

Substituting them into (15) components $\sigma^{ik}_{(o)}$ of the main pressure tensor were obtained. In the case of $\alpha = 0$, or of cylindrical shell, functions F_{i1} and Φ_{i1} given above are not suitable: The corresponding values for F_{11}, F_{21}, F_{31} were given by formulae

$$F_{21} = \sum_{np} b_{np} P_n(\bar{\varphi}) \frac{\pi}{2h} P'_\rho(\bar{z}) \qquad (42)$$

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On pressure-deformed ...

$$F_{11} = \int_{-h}^{z} f_1 dz + \sum_{np} \frac{1}{2} b_{np} P'_n(\bar{\varphi}) P_\rho(\bar{z}) \qquad (43)$$

and

$$F_{31} = \int_{-h}^{z} \chi_1 dz \qquad (47)$$

Analogously Φ_{11}, Φ_{21}, Φ_{31} were obtained, substituted into (39) and $\prod_{i1}^{(o)}$ obtained for the cylindrical case. Comparison of coefficients in (15) gives $\sigma_o^{(ik)}$ for the cylindrical case. Finding the correcting tensor σ_k is reduced to solving an infinite system of algebraical equations

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On pressure-deformed ...

$$\sum_{m}^{N}\sum_{np}[A_{mnp}F_{1\beta}(mnpijk)+B_{mnp}F_{2\beta}(mnpijk)+C_{mnp}F_{3\beta}(mnpijk)]+$$

$$+ L_{\beta}(ijk) = 0 \qquad (49)$$

where (β = 1,2,3), N = 1,2,... Coefficients Fβ and free terms Lβ depend on functions ψ_{ik}. For the first boundary conditions, ψ_{ik} = 0; for the second boundary case, ψ_{ik} are solutions of equations

$$\frac{1+\nu}{E}\int_{M_o}^{M_n}\psi_{ik}(\psi ik)n^i dl = f_k(l_n) - f_k(l_o) - \int_{M_o}^{M_n}\Gamma_{ik}n^i dl \qquad (52)$$

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On pressure-deformed ...

where

$$\Gamma_{ik}=\tilde{\gamma}_{ik}-\Lambda_{\beta}^{\alpha l}(\tilde{x}^{\gamma}-x^{\gamma})\,\Lambda_{l}^{\sigma\beta}g_{\gamma k}\nabla_{\alpha}\tilde{\gamma}_{l\sigma},$$

$$\Psi_{ik}=(1+\varphi)\sqrt{g_{il}g_{kk}}\,\tilde{\psi}_{(ik)}-\left(\frac{\nu}{1+\nu}+\frac{\varphi}{3}\right)(g^{ik}\sqrt{g_{il}g_{kk}}\,\tilde{\psi}_{(ik)})\,g_{ik}-$$

$$-\Lambda_{\beta}^{\alpha l}(\tilde{x}^{\gamma}-x^{\gamma})\,\Lambda_{l}^{\sigma\beta}g_{\gamma k}=\nabla_{\alpha}\left[(1+\varphi)\sqrt{g_{il}g_{\sigma\sigma}}\,\tilde{\psi}_{(l\sigma)}-\left(\frac{\nu}{1+\nu}+\right.\right. \tag{53}$$

$$\left.\left.+\frac{\varphi}{3}\right)(g^{ik}\sqrt{g_{il}g_{\kappa k}}\,\tilde{\psi}_{(ik)})\,g_{l\sigma}\right].$$

Using the appropriate values for $F_{(\beta)}^{ik}$ the components of correcting pressure tensor took the form

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